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THE RELATION OF OPHTHALMOLOGY TO DISEASES OF THE NOSE AND ITS ACCESSORY SINUSES *

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The possibility of involvement of the orbit or its contents in diseases of the nose and accessory sinuses has been so well established from an anatomic point of view as to need no further proof. It is only necessary to study the investigations of Onodi, Birch-Hirschfeld and Loeb to be convinced of this fact. When considered from a clinical point of view, however, the frequency of the association is less constant than the anatomic investigations might lead one to suppose. While in many cases the causal connection is obvious, there are others in which a relation is difficult or indeed impossible to establish.

Diseases are excited in the eye through the nose by direct communication, in the orbit through the anatomic relations of the accessory sinuses, through nervous reflex action, and as a result of general toxemia. It is not always easy from subjective symptoms alone to determine whether the origin of the symptoms-complex is in the eye, the nose or the sinuses. The fact that an eye lesion coexists with a sinus infection is not in itself evidence enough to establish a causal relation. I have seen for instance, a case of tobacco-alcohol amblyopia, giving all the classical symptoms of retrobulbar neuritis, in a patient who had a chronic sinus involvement. Operation was advised, but postponed for various reasons. Alcohol and tobacco were discontinued and the patient made a good recovery. The operation on the sinus was not performed.

The enthusiasm manifested in the reports of cases following the publication of the work of Onodi lead, I

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believe, to conclusions that are not altogether warranted by the history of the cases reported.

A study of the reports of well-authenticated cases, however, leads to the conclusion that many of the diseases of the orbit or its contents can have their origin directly or indirectly in diseases of the nose, the accessory sinuses or the ethmoidal cells.

These diseases have been classified by McKay as follows:

1. Mucocoeles of the sinuses.
2. Acute and chronic sinusitis with external signs of orbital cellulitis, orbital abscess, tumor growth, edema of the lid or dacryocystitis.
3. Sinusitis without external signs of orbital inflammation, but with ophthalmoscopic signs, as optic neuritis, neuroretinitis, retinal thrombosis or phlebitis; or without ophthalmoscopic signs but with visual disturbance as scotoma, visual-field defects, ocular muscle paralysis or fifth nerve disturbance.
4. Cases in which the association of sinus disease has been asserted but questionable glaucoma, iritis, uveitis, keratitis, cataracts and vitreous opacities.

This classification should be modified possibly in some of its details, but the scheme in general is excellent. I shall not speak of the first two groups, but rather confine my remarks to the third and fourth.

The involvement of the optic nerve is said to be due to mechanical pressure by inflammatory exudation in the neighborhood of the sinuses, to distention of the sinus wall, to toxemia, or to occlusion of the central vessels, by embolism or thrombosis. The ophthalmoscopic examination may reveal hyperemia, a congestion with or without edema, a neuritis or a general atrophic process including the whole or part of the nerve. The patient may complain of dimness of vision in one or both eyes, vertigo, headache and other head symptoms. One or both eyes may be affected.

One of the most serious nerve affections depending on sinusitis is the retrobulbar neuritis, in which the papillomacular bundle becomes affected. The reasons often given for this early involvement (as shown by a central scotoma at first relative and later absolute) are pressure on the exposed portion of the particular bundle, pressure

due to vascular changes in the central retinal artery, or toxemia. When one considers the position of the papillomacular bundle in the nerve and its relation to the central artery, it is difficult to see how pressure symptoms can play so important a part as is often assumed.

The macular bundle occupies the peripheral portion of the optic nerve for a distance of about 13 mm. from the globe. It then enters the nerve and soon becomes axial, where it remains throughout the remainder of its course.

The central artery enters the nerve at about the point at which the macular fibers begin to enter. At no time are the macular bundle and central artery in intimate relation.

Because of the proximity of the sinuses to the orbit, a general toxemia may be overlooked in our desire to establish a direct communication as the course of infection. The character of the infection or lack of resistance of the individual to the particular strain may be the cause of the optic nerve involvement, rather than anatomic proximity of the source and dominant symptoms of the infective process. This belief is substantiated by the statement of Onodi that there seems to be no relation between the sinus involved and the nerve affected. Is it not possible that chronicity rather than the location of the infection has most to do with the possibility of optic-nerve involvement, and that a toxemia rather than pressure is responsible for the eye symptoms? This might explain the oft-quoted saying: "The worst sinus cases seem to show the least eye involvement."

Whatever the source of the eye symptoms may be, some brilliant results have been obtained in retrobulbar neuritis through treatment of the sinuses, and no examination of these cases is complete which does not include that of the rhinologists.

The possibility of optic atrophy from posterior ethmoidal suppuration, or from pressure dependent on some sinus involvement, cannot be denied; but to establish a causal relation between the two is most difficult. I have never seen a case of optic atrophy, the origin of which I could prove was due to disease of the sinuses or ethmoidal cells.

That there should be wide variations in the experience of different observers is not to be wondered at when one considers the relation of the optic nerve as given by Onodi. He says:

The optic nerve may come in relation with the sphenoidal sinus or ethmoidal cells, and the wall of the sphenoid may be very thick. The variation in thickness ranges between 1 and 12 mm. It is evident that even destruction of bone may occur in accessory sinuses and yet no visual disturbance result.

While there is no form of visual field contraction which can be considered pathognomonic, there is scarcely any variation in the field that may not be produced by disease of the eye secondary to accessory sinus infection. The most common deviation from the normal occurs in cases of retrobulbar neuritis in irregular central scotomas with or without ophthalmoscopic findings. The attempt to establish a diagnosis of the sinus involved by the quadrant of the field affected has not been successfully established. That there is no uniformity of opinion in this whole subject is shown by the opposing statements of such men as Birch-Hirschfeld and Onodi. Birch-Hirschfeld asserts that central scotoma is an early and important symptom of tumor or suppuration in the posterior sinuses, due to damage to the papillomacular bundle, while Onodi has observed the absence of these phenomena in similar cases and also in one case of sarcoma filling up the nasal cavity. He also asserts that the visual fields are not narrowed in cases of ethmoidal cell suppuration. The more one studies clinical perimetry, the more one hesitates to base any diagnosis on the field findings alone.

The enlargement of the physiologic blind spot has received much attention recently as of diagnostic value in retrobulbar neuritis, but as yet our knowledge of the normal limits of the blind spot is too vague to warrant definite conclusions.

While paralysis of the extrinsic ocular muscles is of exceedingly rare occurrence in sinus involvement, parietic conditions may complicate mild cases of sinusitis, and become manifest as an insufficiency of one or more of the ocular muscles. The muscle itself or the nerve supplying it may become involved. The function of the muscle may be but slightly interfered with, and diplopia

may not be present. The binocular vision may be reduced considerably, while the vision in either eye taken separately may be normal. The diminished binocular vision arises from the inability on the part of the patient to fuse the two images because of the muscle imbalance rather than from any deterioration in his visual acuity. As the impairment of muscular action becomes more marked, a diplopia will appear which, however, may have been present from the first in the extreme field of action of the muscle affected. Muscular insufficiencies are usually seen in cases showing acute inflammatory processes. Marked displacement of the globe may be found in cases in which the false position is assumed so gradually that the desire for monocular vision keeps the visual axes in their proper relation and the muscles adjust themselves to the changing position. Owing to their anatomic relationship the levator, the superior rectus, the superior oblique, the internal rectus, the inferior rectus and the inferior oblique are most exposed and therefore most often affected in sinusitis. The particular muscle involved may suggest the sinus affected, but as the lesion is often multiple too much reliance cannot be placed on this finding.

In certain cases the ocular symptoms may be the only demonstrable manifestation of the sinusitis, the results of nasal examination being negative as well as those obtained by transillumination and roentgenography. If all other etiologic possibilities can be reasonably eliminated, it is becoming common practice to operate on the sinuses in cases showing ocular symptoms which have been proved to exist, such as an infection of the orbit, or retrobulbar neuritis. On the other hand, in cases which show optic atrophy or true paralysis of the extrinsic muscles, confirmatory local symptoms should be present before surgery is resorted to.

I have had occasion to study only two cases of thrombosis of the central vein with reference to sinusitis, and in neither case was I able to establish a causal relation. The sinuses were not explored by operation, however, and as no satisfactory etiologic factor was determined in either case, the real source of trouble may have been overlooked.

In regard to the fourth group in our classification, cases in which the association of sinus disease has been

asserted but is questionable, I should make some change. Included in this group are glaucoma, iritis, uveitis, keratitis, cataracts and vitreous opacities. I can see no reason why iritis and also uveitis should not result from an infection of the sinuses, just as they result from a similar infection in the alveolar process or the prostate.

The number of diseases remaining in the last group may be even less when their etiology is better known.